solution and theory of quadratic equations. The style is attractive, and well suited to beginners. The answers themselves occupy more than fifty pages, and the volume can, if desired, be obtained without these at a reduction in cost.

The movement of reform in the teaching of elementary mathematics has affected trigonometry, and an outcome is seen in the new text-book by Messrs. Borchardt and Perrott, in which the authors have aimed at presenting the subject in a manner suited to the new conditions. Four-figure mathematical tables are provided for general use. Graphs are introduced from time to time. The first endeavour of the authors is to give the student a good working knowledge of the elements of trigonometry, with facility in practical computation. The opening chapters are thus confined to acute angles. Easy problems are solved on heights and distances, but more attention might well have been given to the solution of right-angled triangles under all sorts of conditions, as this is fundamental. In establishing the general formula for angles of any magnitude, the authors have not perceived that a satisfactory account can only be given by introducing the conception of a vector, with the projections of rotation vectors and vector polygons. Consequently, the heart of the matter is missed, and the foundation for future development is not completely laid. The usual formulæ for triangles, and for compound, multiple, and submultiple angles are established, the work consisting largely of a mass of trigonometrical transformations. It is not evident why practical applications should be confined to problems in surveying. There are other rich sources to draw from. Thus, an investigation of simple harmonic motion could be made to throw a flood of light on the significance of trigonometrical formulæ, awakening a living interest in dead symbols. This is the first half of the complete text-book. The part which is to follow will contain chapters on De Moivre's theorem, the exponential theorem, trigonometrical series, &c. The book is a fair attempt to teach elementary trigonometry in a more rational manner, but falls far short of the ideal text-book on the subject.

The remarks just made apply generally to the volume by Messrs. Lachlan and Fletcher, except that the whole of the subject-matter, including De Moivre's theorem, &c., is compressed into one small volume, and in order to be suitable for beginners would require considerably to be amplified and supplemented by the teacher.

The "Preliminary Practical Mathematics" by Messrs. Starling and Clarke is the result of experience gained with technical students, who find, when entering the laboratory or workshop, that their mathematical knowledge is not suited to the requirements, and who have not time to enter on an extended mathematical course to supply the deficiency. If the subject were properly taught to boys at school, a book like the present would not be required.

The ground covered in Mr. Kerr's "Constructive Geometry" is substantially that of the first three books of Euclid's Elements, but the treatment of the subject is in accordance with modern ideas, and is very suitable indeed for beginners. Starting with a few concrete objects and using simple drawing appliances for quantitative experimental work, the pupil "is helped to build up ideas about lines, points, triangles, circles, &c., in precisely the same way as that followed in dealing with the elements of physics and chemistry." Deductive reasoning is increasingly employed as the pupil advances, and we think the author is justified in hoping that "there will be as net result an extensive fund of available knowledge on which more advanced work can rest securely, and also such habits of inquiry and thought as will give a stimulus to further study."

The "New School Arithmetic" by Messrs. Pendlebury and Robinson is based on the sixteenth edition of the Arithmetic by the former, the first edition of which was published eighteen years ago. During this time commercial conditions have changed, scientific requirements have advanced, and a reform in the teaching of elementary mathematics has been inaugurated. The authors have aimed at producing a text-book which shall be fully abreast of the times. Thus metric weights and measures are given and used along with British, and these, being introduced at an early stage, afford excellent concrete examples in illustration of vulgar and decimal fractions. The new style of multiplication is used exclusively, and thus at the proper time approximate methods become natural and easy. Squared paper and other graphical illustrations are used with good effect, and algebraical symbols are introduced on appropriate occasions. The present volume deals with money, weights and measures, and examples thereon, with vulgar and decimal fractions, and with the decimalisation of money. The examples are very numerous and well graduated. The style is simple and clear, and altogether this excellent text-book deserves a wide circulation.

OUR BOOKSHELF.

Die Vorgeschichte des Menschen. By G. Schwalbe. Pp. 52+1 plate. (Brunswick: Vieweg und Sohn, 1904.)

THE author of this work is already well known by his writings on *Pithecanthropus erectus*, the Neanderthal skull, and that of Egisheim. The basis of the pamphlet now before us is a lecture delivered by the author at the meeting of the Society of German Naturalists and Physicians, held at Cassel in 1903, but two valuable appendices have been added to the original lecture. The line of argument runs in the main on palæontological and anatomical evidence, though the existence of man in pre-Glacial times is regarded as an established fact. The writer claims for the Neanderthal man a specific distinction from the "homo sapiens" of Linnæus, and would term him "homo primigenius." He traces the relations of this early representative of the human race not only with the *Pithecanthropus erectus*, but with the Dryopithecus and some of the more anthropoid forms of living apes, and in the illustrative plate gives diagrams of the forms of the different skulls. The agreement of the human remains from Spy, in Belgium, with those from the Neanderthal is accepted, and those from the Krapina cave, in Croatia, though varying in the brachycephalic direction, are regarded as belonging to the "homo primigenius." Mr. Schwalbe seems even inclined to accept evidence of the existence of man in Tertiary times. Whether his conclusions can in all cases be adopted without hesitation or not, his arguments are worthy of careful consideration, and the

© 1904 Nature Publishing Group

appendices, which include an extensive catalogue of the literature on the subject of primæval man, will be found to contain a large amount of useful information.

J. E.

Metallurgia dell' Oro. By Ing. Emilio Cortese. Pp. xv+262; 35 incisioni. (Milano: Ulrico Hoepli, 1904.) Price 3 lire.

Metalli Preziosi. By Ing. A. Zinone. Pp. xi+315. (Milano: Ulrico Hoepli, 1904.) Price 3 lire.

NOTHING exactly resembling the Hoepli manuals is published in the English language, though in French the "Encyclopédie scientifique des Aide-Memoire" constitutes a close parallel. The Hoepli series now amounts to 800 little volumes dealing with science, literature, and the fine arts. The method of publishing is useful, and contrasts favourably with the inconvenient system adopted in the old-fashioned encyclopædias with large volumes containing heterogeneous congeries of subjects. The latest additions to the series are neatly bound, well printed with good sized type, and can be carried in the pocket. The book on the metallurgy of gold contains brief accounts of the washing and sluicing of auriferous gravels, and of the crushing and amalgamation of gold ores. There are also chapters on the Plattner and Mears processes of chlorination, on cyaniding, and on the refining and parting of gold bullion. The descriptions are fairly clear and accurate, but some of them deal with antiquated processes. The Newbery-Vautin process, the Crauford mill, and Greenwood's electrolytic process are all described, but on the other hand no mention is made of the use of the lead-zinc couple in the precipitation of gold from cyanide solutions, or of Taverner's lead-smelting process. In the other book, the metals dealt with are silver, gold, and platinum. The properties of these metals and their alloys, and the methods of assaying and treating their ores are briefly described, and the remaining eighty-five pages of the book are devoted to the uses of gold and silver in the arts. Both volumes are supplied with a complete table of contents, but suffer from the absence of indexes.

The Telephone Service: its Past, its Present, and its Future. By H. L. Webb. Pp. 118. (London: Whittaker and Co., 1904.) Price 1s. net.

AN interesting description of the general working of the modern city telephone system is given in the pages of this book. No attempt is made to describe the power plant of the modern telephone exchange, or the details of other parts of the machinery by which an efficient telephone service is maintained, but the general principles of this means of communication are clearly explained, and suggested developments of telephone policy in Great Britain are discussed. Every subscriber who reads the book will be given an intelligent and tolerant view of the telephone service.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Magnetic Disturbances and Navigation.

CAN the compasses of modern ships be influenced by magnetic disturbances to such a degree as to imperil navigation? The disaster which on the morning of June 28 befell the Danish s.s. *Norge*, and by which about 600 lives were lost, ought, in the opinion of the present writer, to bring this question to the front. The course of the ship should take her about 25 miles south of Rockall. The last observations, by which position, deviation, and the absence of current were ascertained, were made only twelve hours before the ship struck, and showed nothing extraordinary. It seems impossible to explain the discrepancy between the real position and that of the reckoning on the morning of June 28 without assuming a sudden and considerable alteration of the deviation on the compass.

This view is supported by communications, called forth by the disaster, from two captains, who have, or at any rate think they have, directly observed such alterations. The communications run as follows:—

(1) "A few years ago I (Captain Hveysel, s.s. *L. H. Carl*) was on a voyage from the United States of America to Denmark, following the great circle from Newfoundland to Pentland Firth. About 200 miles west of Rockall I had the position at noon accurately determined by observations of the sun, but as the sky was clear in the dusk, I determined anew the latitude, as well as the longitude, by stellar observations, and found to my astonishment that the ship had gone forward in a direction about 1 point more southerly than calculated according to the reckoning. By observation of the pole star it was in fact ascertained that both the compasses of the ship had acquired a hitherto unknown easterly deviation of 10° to 11°. The weather was fine, but a faint northern light was observed, which I supposed to be the cause of the magnetic disturbance. The course was shaped in accordance with the new deviation, but I continued to take the bearings of the pole star, and towards midnight the compasses were observed to return to their normal deviation, while the aurora disappeared."

(2) "I, Captain F. W. Horner, master of the s.s. *Elixir* of West Hartlepool, while on a voyage from Port Inglis, Florida, to Linhamn, Sweden, between noon June 24 and noon June 25, in the vicinity of the Island of Rockall, found by observation of the sun that the deviation on the compasses had changed 9°, whereby my ship had gone 25 miles out of her course to the north. I was steering to pass 20 miles north of Rockall, and found by observation at noon June 25 that I had passed 45 miles north of it. After passing through the Pentland Firth the compasses again returned to normal."

This last observation has a special interest as relating to the immediate vicinity of Rockall, and to about the same time as the shipwreck of the s.s. *Norge*. Can any of your readers furnish facts of a similar nature?

So far as I have been able to ascertain, disturbances of the declination needle of like duration and intensity are completely unknown, but, to my mind at least, compasses, mounted in steel ships and compensated by powerful magnets, cannot be directly comparable to the needles of a magnetic observatory. Is it possible to explain such temporary deviations of ships' compasses, as appear to have been observed in the cases related above, from the known variations of the earth's magnetism?

AUGUST KROGH.

The Physiological Laboratory, Copenhagen University.

The Great Red Spot on Jupiter.

OWING to very ill-health, I have not been able to make observations of Jupiter during the last few weeks, but have been interested in receiving the results of some other observers. It appears that the great red spot is rapidly accelerating its motion, so that its longitude is decreasing, and with a continuation of this behaviour the spot will ultimately correspond with the position of the zero meridian of system ii. of Crommelin's ephemerides. The present longitude of the marking is about 25°, which is the same as it was in the summer of 1898, so that the mean period of rotation during the last six years has been identical with the rate of system ii., viz. 9h. 55m. 40·63s.

The variations in the velocity of the spot during the past few years have exhibited a curious oscillation, and it will be important to watch the future developments of the object. It would be interesting to see in NATURE during ensuing months some reports from observers as to whether this singularly durable marking maintains its present rapid westerly drift.

W. F. DENNING.

Bristol, September 12.

© 1904 Nature Publishing Group